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Title : Effects of dimethyl sulfoxyde (DMSO) and lipid extraction methods on stable carbon and nitrogen isotope ratios in the skin of odontocetes and mysticetes

Category : Ecology

Student :

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Abstract : Biopsy sampling of cetaceans is a minimally invasive technique that is often used to obtain samples for multiple applications. The small size of samples and the need for particular preservation techniques often limit the number and types of analyses that can be completed. Skin samples are often collected for genetics, and are usually stored in dimethyl sulfoxyde (DMSO) upon collection. Skin can also be used to examine cetacean trophic position and diet through the analysis of stables isotope ratios (e.g. 13C/12C, 15N/14N). However, DMSO is a carbon-rich substance which might alter stable carbon isotope ratios. The main objective of this study was to determine, and most importantly, predict the effect of DMSO on stable carbon and nitrogen isotope ratios. The efficiency of the Soxhlet method which has been used traditionally to extract lipids and DMSO was compared with that of a method (Folch) necessitating lesser quantities of tissue, and thus more suitable than the Soxhlet method for small samples. DMSO-treated skin samples of beluga whales had significantly lower 13C/12C and 15N/14N values than frozen skin samples (n=15; paired t-tests: each $p < 0.0001$).. However, 13C/12C and 15N/14N values that would have been obtained if skin samples had been frozen directly can be predicted accurately from DMSO-extracted samples in both odontocetes (n=13 beluga; r2=0.78 and 0.76, respectively) and mysticetes (n=11 finback, minke or blue whales; r2=0.90 and 0.91, respectively). The Folch method provided slightly, but not significantly, higher 13C/12C values than the Soxhlet method (paired t-test: p=0.18, but n=5), suggesting that the Folch method is at least as efficient as the Soxhlet method in extracting lipids from small samples. The Folch method permitted a better recovery of material than the Soxhlet technique and can be used to accurately predict 13C/12C and 15N/14N values from DMSO-extracted skin samples of cetaceans.